

Multivariate Copula-based SUR Tobit Models: A Modified Inference Function for Margins and Interval Estimation

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Resumo/Abstract:

In this paper, we extend the analysis of multivariate Seemingly Unrelated Regression (SUR) Tobit models by modeling their nonlinear dependence structures through copulas. The capability in coupling together the different and possibly non-normal marginal distributions allows the flexible modeling for the SUR Tobit models. In addition, the ability to capture the tail dependence of the SUR Tobit models where some data are censored is another useful feature of copulas. Our study proposes a modified version of the Inference Function for Margins (IFM) method by Joe Xu (1996), which we refer to as MIFM method, to obtain the (point) estimates of the marginal and copula association parameters. Such modification at the second stage of the usual method is justified in order to obtain continuous marginal distributions, which ensures the uniqueness of the resulting copula, as stated by Sklar (1959)'s theorem; and also to provide an unbiased estimate of the copula association parameter (the IFM method provides a biased estimate of the copula parameter in the presence of censored observations in the margins). Since the usual asymptotic approach, that is the computation of the asymptotic covariance matrix of the parameter estimates, is troublesome in this case, we also propose the use of resampling procedures to obtain confidence intervals for the copula based SUR Tobit model parameters. Coauthored by Francisco Louzada (USP, SP).